

# **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.





USDA Forest Service

Rocky Mountain Forest and  
Range Experiment Station

## Detecting Tip Mining Olethreutinae (Tortricidae) Moths in the Northern and Central Great Plains with Synthetic Attractants

Mary Ellen Dix,<sup>1</sup> Arden D. Tagestad,<sup>2</sup> John D. Stein,<sup>3</sup> and Martin Jacobson<sup>4</sup>

Fifteen sites in eight north-central states were surveyed for male Olethreutinae with traps containing synthetic attractants. Six *Rhyacionia* spp., 2 *Petrova* spp., 13 other Tortricidae, 4 Noctuidae, 1 Pyralidae and 1 Gelechiidae were captured. No species was caught at every site within its range. The flight periods of the moths are described.

**Keywords:** *Rhyacionia*, *Petrova*, *Cydia*, *Chionodes*, *Dichrorampha*, *Episionus*, *Paralobesia*, *Ancylis*, *Pseudogalleria*, *Loxostege*, Lepidoptera

PSW FOREST AND RANGE  
EXPERIMENT STATION  
SEP 28 1984  
STATION LIBRARY COPY

### Introduction

Sex pheromones and synthetic attractants have received considerable attention as survey tools for selected Lepidopteran species, including several species of Olethreutinae (Roelofs and Comeau 1970, Mayer and McLaughlin 1975, Sartwell et al. 1980, Stevens et al. 1980). They are ideal for detecting and assessing infestations of boring and tip mining insects whose larvae and damage are concealed within the tree. Because these insects are not readily visible, their detection by conventional methods is time-consuming, and infestations are frequently over-looked. Attractants may also be used in

determining the flight period of the moths and to time subsequent insecticide applications against the newly hatched, unprotected larvae before they mine into the tree.

This paper describes a survey with synthetic attractants to detect tortricid moths, especially the tip mining *Rhyacionia* spp. and *Petrova* spp., in the northern and central Great Plains and surrounding states. The approximate flight period of the moths and possible attractants are also identified. Such information can be used to develop more effective techniques for trapping male *Rhyacionia* spp., and *P. metallica*, and to assess their populations.

<sup>1</sup>Research Entomologist, Rocky Mountain Forest and Range Experiment Station, USDA Forest Service, with central headquarters maintained at Fort Collins, in cooperation with Colorado State University. Author now located at Lincoln, Nebraska in cooperation with University of Nebraska, Lincoln. 68583.

<sup>2</sup>920 Nichol Street, Bottineau, North Dakota 58318. Formerly technician at Rocky Mountain Forest and Range Experiment Station, USDA Forest Service, Shelterbelt Laboratory in Bottineau.

<sup>3</sup>Research Entomologist, Pacific Southwest Forest and Range Station, USDA Forest Service, Berkeley, Calif. 94701.

<sup>4</sup>Supervisory Research Chemist, Biologically Active Natural Products Laboratory, Agricultural Environmental Quality Institute, ARS, Beltsville, Md. 20705.

### Methods and Materials

During the period April through July, several attractants of Olethreutinae and other closely related compounds were screened in 15 ponderosa pine plantings or woodlands (Tables 1 and 2). All traps were placed in the field after the ground thawed and before the pines flushed. The date of initial trap placement varied with geographical location.

Table 1.—Species of Lepidoptera attracted to the synthetic compounds screened

Species	Compound screened <sup>1</sup> (number caught)															
	(E)-6-nonen-1-ol acetate	methyl (E)-6-nonenolate	(Z)-7-decen-1-ol acetate	9-decen-1-ol acetate	(E)-7,8-epoxydecan-2-one	(Z)-7-dodecen-1-ol acetate	8-dodecen-1-ol acetate	(Z)-8-dodecen-1-ol acetate	(Z)-9-dodecen-1-ol acetate	(E)-9-dodecen-1-ol acetate	(E)-10-dodecen-1-ol acetate	(Z,E)-9,12-tetradecadien-1-ol acetate	(E)-10-tetradecen-1-ol acetate	(E)-7,8-epoxy-2-methyloctadecane	2-(phenoxy) tetrahydrofuran	acetone
TORTRICIDAE																
<i>Petrova metallica</i> (Busck)	--	--	28	26	--	43	--	2	--	6	--	--	80	--	--	--
<i>Petrova gemistrigulana</i> (Kearfott)	--	--	--	--	--	8	--	--	--	--	--	--	--	--	--	--
<i>Rhyacionia buoliana</i> (Denis & Schiffermuller)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3
<i>Rhyacionia bushnellii</i> (Busck)	4	12	--	22	2	--	--	--	26	3	1	--	1	12	7	--
<i>Rhyacionia frustrana</i> (Comstock)	--	--	1	--	8	--	16	--	--	12	1	24	18	--	--	--
<i>Rhyacionia fumosana</i> Powell	--	--	14	--	--	--	--	2	--	47	1	--	--	--	--	--
<i>Rhyacionia neomexicana</i> Dyar	--	--	--	--	--	--	--	--	2	56	--	--	--	--	--	--
<i>Rhyacionia zozana</i> Kearfott	--	--	--	--	--	--	--	5	--	195	--	--	--	--	--	--
<i>Cydia youngana</i> (Kearfott)	--	--	--	--	--	--	8	--	--	--	--	--	--	--	--	--
<i>Cydia laricana</i> Busck	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--
<i>Cydia bracteata</i> (Fernald)	--	--	--	--	--	--	--	--	12	--	--	--	--	--	--	--
<i>Dichrorampha sedatana</i> (Busck)	--	--	11	--	--	--	11	--	--	--	1	--	--	--	--	--
<i>Episimus argutanus</i> Clemens	--	--	--	--	--	--	--	--	2	2	2	--	--	--	--	--
<i>Grapholitha</i> spp.	--	--	4	--	--	4	--	--	9	--	--	--	--	--	--	--
<i>Ecdytolopa instiiticiana</i> Zeller	--	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--
<i>Paralobesia caraduana</i> (Busck)	--	--	--	--	--	--	--	--	60	5	--	--	--	--	--	29
<i>Ancylis mediofasiana</i> (Clemens)	--	--	--	--	--	--	--	--	--	43	3	--	--	--	--	--
<i>Pseudogalleria imicella</i> (Zeller)	--	--	--	--	--	--	--	24	--	--	6	--	--	--	--	--
NOCTUIDAE																
<i>Oligia mactata</i> Guenee	--	1	--	--	--	--	--	--	--	--	--	8	--	--	--	--
<i>Xylomiges dolosa</i> Grote	--	--	17	--	--	12	--	--	--	--	--	--	--	--	--	--
PYRALIDAE																
<i>Loxostege chortalis</i> Grote	--	--	--	--	--	--	--	--	--	59	--	--	--	--	--	--
GELECHIIDAE																
<i>Chionodes</i> spp.	--	--	61	--	--	212	44	--	--	4	4	129	--	--	--	--

<sup>1</sup>Synthetic attractants that caught less than 3 moths or no moths are: 7-dodecen-1-ol acetate, (Z)-11-tetradecen-1-ol acetate, (Z,Z)-7,11-hexadecadien-1-ol acetate, (Z,E)-7,11-hexadecadien-1-ol acetate, and 50% (Z,E)-7,11-hexadecadien-1-ol acetate, plus 50% (Z,Z)-7,11-hexadecadien-1-ol acetate.

Table 2.—Species of Olethreutinae (Tortricidae) tip miners caught at 15 sites in or near the Great Plains

Site	Species							
	<i>Rhyacionia bushnelli</i> (Busck)		<i>Rhyacionia frustrana</i> (Comstock)		<i>Rhyacionia fumosana</i> Powell		<i>Rhyacionia neomexicana</i> Dyar	
	Total moths	Trapping period	Total moths	Trapping period	Total moths	Trapping period	Total moths	Trapping period
Lubrecht Experimental Forest, Missoula County, Montana	--	--	--	--	--	--	--	--
Denbigh, North Dakota	--	--	--	--	--	--	--	--
Kindred, North Dakota	--	--	--	--	--	--	--	--
Walhalla, North Dakota	--	--	--	--	--	--	--	--
Black Hills Experimental Forest, South Dakota	--	--	--	--	14	5/5-5/27	--	--
Watertown, South Dakota	--	--	--	--	--	--	--	--
Log Cabin Unit, Roosevelt National Forest, Colorado	--	--	--	--	48	5/9-6/20	--	--
Rist Canyon Unit, Roosevelt National Forest, Colorado	--	--	--	--	2	5/8-6/2	56	5/8-6/2
Chadron, Nebraska	--	--	--	--	--	--	--	--
Hastings, Nebraska	91	5/1-5/22	--	--	--	--	--	--
Scottsbluff, Nebraska	--	--	--	--	--	--	2	4/22-5/21
Manhattan, Kansas	--	--	80	4/15-5/6	--	--	--	--
Ames, Iowa	--	--	--	--	--	--	--	--
Dixon Springs, Illinois	--	--	--	--	--	--	--	--
Urbana, Illinois	--	--	--	--	--	--	--	--

The traps were cardboard cups (2.4 l) with a 2.5 cm diameter opening at both ends. The inside of the cup was coated with Stikem Special.<sup>5</sup> A cotton wick dispenser (12 × 10 mm OD) impregnated with 10 mg of an attractant and 10 mg of the extender trioctanoin was placed in the bottom of each trap. Candidate lures were either attractants of male tortricids or were related compounds. All compounds were synthesized by standard methods and were at least 95% isomerically pure as determined by argentation chromatography using cation exchange resin columns (Houx et al. 1974).

Cooperators randomly placed 20 traps in each woodland or planting in early spring. Traps were hung about 1.5 m above ground at least 10 m apart. Three weeks later, freshly baited traps were hung at each site. Screening tests were terminated after two 3-week periods of trapping. Traps were then stored in a cool location prior to their shipment to the USDA Forest Service Shelterbelt Laboratory in Bottineau, North Dakota.

<sup>5</sup>Trade and company names are used for the benefit of the reader, and do not imply endorsement or preferential treatment by the U.S. Department of Agriculture.

Moths were removed from the traps with forceps or by carefully cutting the trap around the male. Representative samples of each species were sent to taxonomists for identification.<sup>6</sup>

## Results and Discussion

Twenty-one tortricid species, four noctuid species, one pyralid species, and one gelechid species were caught in the traps (Table 1). None of the species was caught at all sites surveyed. *Rhyacionia* spp. and *Petrova metallica* (Busck) were caught only at sites within their known ranges as described by Powell and Miller (1978) and Miller (1978), respectively.

<sup>6</sup>William Miller, USDA Forest Service, Lake States Experiment Station, St. Paul, Minn., identified the Tortricidae; R. W. Hodges, USDA, SEA-AR, Northeastern Region Agricultural Research Center, Beltsville, Md., identified the Gelechiidae; D. C. Ferguson, SEA-AR, Northeastern Region Agricultural Research Center, Beltsville, Md. identified the Pyralidae; and E. H. Metzler, Department of Entomology, Ohio Agricultural Research and Development Center, Wooster, and E. L. Todd, ARS, Northeastern Region, Agricultural Research Center, Beltsville, Md., identified the Noctuidae.



Rocky  
Mountains



Southwest



Great  
Plains

U.S. Department of Agriculture  
Forest Service

## Rocky Mountain Forest and Range Experiment Station

The Rocky Mountain Station is one of eight regional experiment stations, plus the Forest Products Laboratory and the Washington Office Staff, that make up the Forest Service research organization.

### RESEARCH FOCUS

Research programs at the Rocky Mountain Station are coordinated with area universities and with other institutions. Many studies are conducted on a cooperative basis to accelerate solutions to problems involving range, water, wildlife and fish habitat, human and community development, timber, recreation, protection, and multiresource evaluation.

### RESEARCH LOCATIONS

Research Work Units of the Rocky Mountain Station are operated in cooperation with universities in the following cities:

Albuquerque, New Mexico  
Flagstaff, Arizona  
Fort Collins, Colorado\*  
Laramie, Wyoming  
Lincoln, Nebraska  
Rapid City, South Dakota  
Tempe, Arizona

\*Station Headquarters: 240 W. Prospect St., Fort Collins, CO 80526